

**REMARKS**

This is in response to the Office Action mailed November 17, 2005.

Claims 1 through 4, 6 through 12, 14 through 29, 31 through 37 and 39 through 45 are currently pending in the application.

Claims 1 through 4, 6, 8 through 12, 14 through 20, 22, 24 through 29, 31, 33 through 37 and 39 through 45 stand rejected. Applicants have amended claims 1, 22, 24, and 25, and respectfully request reconsideration of the application as amended herein.

**35 U.S.C. § 112 Claim Rejections**

Claims 1 through 4, 6, 8 through 12, 14 through 20, 22, 24 through 29, 31, 33 through 37 and 39 through 45 stand rejected under 35 U.S.C. § 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants have amended independent claims 1, 22, 24, and 25 to recite that the plurality of leads of the lead frame have reduced lead inductance. Applicants assert that presently amended independent claims 1, 22, 24, and 25 comply with the provisions of 35 U.S.C. § 112, first paragraph.

Claims 1 through 4, 6, 8 through 12, 14 through 20, 22, 24 through 29, 31, 33 through 37 and 39 through 45 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicants regard as the invention. Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants have amended independent claims 1, 22, 24, and 25 to recite that the plurality of leads of the lead frame have reduced lead inductance. Applicants assert that presently amended independent claims 1, 22, 24, and 25 comply with the provisions of 35 U.S.C. § 112, second paragraph.

**35 U.S.C. § 102(b) Anticipation Rejections**

Anticipation Rejection Based on U.S. Patent 5,701,034 to Marrs or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Marrs

Claims 1, 2, 4, 6, 8 through 12, 14 through 20, 24 through 27, 29, 31, 33 through 37 and 39 through 45 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Marrs (U.S. Patent 5,701,034) or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Marrs. Applicants respectfully traverse this rejection, as hereinafter set forth.

Applicants assert that a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.

*Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the **prior art reference (or references when combined) must teach or suggest all the claim limitations**. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

After carefully considering the cited prior art, the rejections, and the Examiner's comments, Applicants have amended the claimed invention to clearly distinguish over the cited prior art.

Applicants assert that the claimed inventions of presently amended independent claims 1, 22, 24, and 25 are not anticipated by Marrs under 35 U.S.C. § 102 because Marrs does not identically describe each and every element of the claimed invention in as complete detail as contained in the claims. Applicants further assert that Marrs does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed inventions of presently

amended independent claims 1, 22, 24, and 25 because Marrs does not teach or suggest all the claim limitations of the claimed inventions.

Turning to the cited prior art, Applicants assert that Marrs describes or teaches or suggests a packaged integrated circuit including a heat sink with a locking moat. (Col. 5, lines 1-3). A semiconductor die is attached to a surface of a heat sink using adhesive. (Col. 5, lines 6-8). Package leads are attached to the heat sink also using adhesive. (Col. 5, lines 15-16). Using conventional bond wiring methods the bond wires are extended between the bond pads on the semiconductor die and the heat sink. (Col. 5, lines 18-24). The die, heat sink, bond wires and inner portions of package leads are encapsulated by molding in encapsulant. (Col. 5, lines 24-28). The encapsulant fills in the locking moat formed in the heat sink and becomes interlocked with the heat sink. (Col. 5, lines 29-32). Additionally, Marrs describes or teaches or suggests a packaged semiconductor die or dice including a heat sink with a locking feature that can be used to support one or more generally conductive layers thereon and insulated from the heat sink to provide a ground plane or planes, power plane or planes, or signal routing. (See FIG. 4, COLUMN 4, Lines 10-13.)

By way of contrast to the invention described or taught or suggested by Marrs, the embodiment of the invention set forth in claim 1 recites elements of the invention calling for an integrated circuit package comprising “an integrated circuit die positioned within the package body”, “a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area”, and “an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame

reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries". Applicants assert that Marrs does not identically describe, either expressly or inherently, an integrated circuit die positioned within the package body, nor does Marrs identically describe, either expressly or inherently, a lead frame having a plurality of leads having portions enclosed within the package body, nor identically describe "an electrically conductive heat sink positioned at least partially within the package body . . . reducing lead inductance at least about 0.90 nanoheneries. Furthermore, Applicants assert that Marrs fails to describe, either expressly or inherently, "a second portion of the heat sink projecting away from the first portion of the heat sink under the die-attach area".

In Marrs the package body 101 is covered with an encapsulant 120. (FIG. 1, Col. 5, lines 3-4). The leads 102 are external to the integrated circuit or semiconductor die and are attached to heat sink 110 using adhesive 118. (Col. 5, lines 13-15) and are partially covered with encapsulant 120.

Furthermore, Marrs does not identically describe, either expressly or inherently, "an electrically conductive heat sink". Marrs description sets forth that the packaged integrated circuit 200 may be placed on a conductive layer 206, which is sandwiched in between dielectric layers 204 and 208, which are formed around the periphery of the die 101. (Col. 5, lines 34-42). The Applicants' invention incorporates a conductive or ground plane property into the heat sink itself, not the underlying substrate, for reducing lead inductance at least about 0.90 nanoheneries. Thus, Marrs does not identically describe the elements of Applicants' presently claimed inventions of presently amended independent claim 1.

Additionally, Applicants assert that Marrs does not describe either explicitly or inherently "a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink projecting away from the first portion of the heat sink." Marrs describes a single piece heat sink 110 having a locking moat 112. (FIG. 1). Since Marrs describes only a single piece heat sink, Marrs cannot describe a second portion projecting away from the first portion of the heat sink.

As Marrs fails to expressly or inherently identically describe every element of claim 1, Applicants assert that claim 1 is not anticipated by Marrs under 35 U.S.C. § 102.

Claims 2, 4, 6, 8 through 12, and 14 through 20 are allowable as either directly or indirectly from allowable claim 1.

Applicants assert that Marrs does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because Marrs does not teach or suggest the claim limitations of presently amended independent claim 1 calling for an integrated circuit package comprising “an integrated circuit die positioned within the package body”, “a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area”, and “an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink directly coupled to one of a signal voltage and a reference voltage, the heat sink operating respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries”. Applicants assert that Marrs does not teach or suggest the claim limitations of an integrated circuit die positioned within the package body, nor does Marrs teach or suggest the claim limitations calling for a lead frame having a plurality of leads having portions enclosed within the package body, nor identically describe “an electrically conductive heat sink positioned at least partially within the package body . . . reducing lead inductance at least about 0.90 nanoheneries. Furthermore, Applicants assert that Marrs fails to teach or suggest the claim limitations calling for “a second portion of the heat sink projecting away from the first portion of the heat sink under the die-attach area”.

In Marrs, the package body 101 is covered with an encapsulant 120. (FIG. 1, Col. 5, lines 3-4). The leads 102 are external to the integrated circuit or semiconductor die and are attached to heat sink 110 using adhesive 118. (Col. 5, lines 13-15) and are partially covered with encapsulant 120.

Furthermore, Marrs does not teach or suggest the claim limitations calling for “an electrically conductive heat sink”. Marrs description sets forth that the packaged integrated circuit 200 may be placed on a conductive layer 206, which is sandwiched in between dielectric layers 204 and 208, which are formed around the periphery of the die 101. (Col. 5, lines 34-42). The Applicants’ invention incorporates a conductive or ground plane property into the heat sink itself, not the underlying substrate, for reducing lead inductance at least about 0.90 nanoheneries. Thus, Marrs does not teach or suggest the claim limitations of Applicants’ claimed invention of presently amended independent claim 1.

Additionally, Applicants assert that Marrs does not teach or suggest the claim limitation calling for “a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink projecting away from the first portion of the heat sink.” Marrs teaches or suggests a single piece heat sink 110 having a locking moat 112. (FIG. 1). Since Marrs describes only a single piece heat sink, Marrs cannot describe a second portion projecting away from the first portion of the heat sink.

As Marrs fails to teach or suggest all the claim limitations of the claimed invention of presently amended independent claim 1, Applicants assert that presently amended independent claim 1 is allowable.

Applicants assert that the nonobviousness of independent claim 1 precludes a rejection of claims 2, 4, 6, 8 through 12, and 14 through 20 which depend therefrom because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), see also MPEP § 2143.03.* Therefore, the Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to presently amended independent claim 1 and claims 2, 4, 6, 8 through 12, and 16 through 20 which depend therefrom.

Applicants assert that presently amended independent claim 22 is allowable as Marrs does not describe “an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package

body forming an area and having a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink and the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries". Marrs describes or teaches or suggests a one-piece heat sink 110. (FIG. 1). Furthermore, the heat sink in Marrs does not vary in thickness, rather, there is only a slot formed in a portion thereof. (FIGs. 1, 2A, 2B, 4, 8). Additionally, Marrs does not identically describe, either expressly or inherently, a conductive or ground plane property into the heat sink itself for reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries. Since Marrs fails to identically describe, either expressly or inherently, each and every element of claim 22, Applicants respectfully submits that claim 22 is not anticipated by Marrs under 35 U.S.C. § 102.

Applicants assert that Marrs does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because Marrs does not teach or suggest the claim limitations of presently amended independent claim 22 calling for "an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body forming an area and having a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink and the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries". Marrs or teaches or suggests a one-piece heat sink 110. (FIG. 1). Furthermore, the heat sink in Marrs does not vary in thickness, rather, there is only a slot formed in a portion thereof. (FIGs. 1, 2A, 2B, 4, 8). Additionally, Marrs does not teach or suggest a conductive or ground plane property into the heat sink itself for reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries. Since Marrs fails to teach or suggest all the claim limitations of presently amended independent claim 22, Applicants respectfully submits that Marrs does not establish a *prima facie* case of

obviousness under 35 U.S.C. § 103 regarding the claimed invention of presently amended independent claim 22.

As Marrs fails to teach or suggest all the claim limitations of the claimed invention of presently amended independent claim 22, Applicants assert that presently amended independent claim 22 is allowable.

Applicants assert that presently amended independent claim 24 is allowable as Marrs does not describe “an electrically conductive heat sink positioned at least partially within the package body with a vertically extending columnar portion surrounded by a horizontally extending skirt portion having a vertical thickness, said columnar portion having a vertical thickness which is greater than the vertical thickness of said skirt portion, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body, the die-attach surface being attached to the integrated circuit die for reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries”. Applicants assert that Marrs describes a one-piece heat sink 110. (FIG. 1). Furthermore, the heat sink in Marrs does not vary in thickness, rather, there is only a slot formed in a portion thereof. (FIGs. 1, 2A, 2B, 4, 8). Additionally, Marrs does not identically describe, either expressly or inherently, a conductive or ground plane property into the heat sink itself for reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanohenries. Since Marrs fails to identically describe, either expressly or inherently, each and every element of claim 24, Applicants respectfully submits that claim 24 is not anticipated by Marrs under 35 U.S.C. § 102.

Applicants assert that Marrs does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because Marrs does not teach or suggest the claim limitations of presently amended independent claim 24 calling for “an electrically conductive heat sink positioned at least partially within the package body with a vertically extending columnar portion surrounded by a horizontally extending skirt portion having a vertical thickness, said columnar portion

having a vertical thickness which is greater than the vertical thickness of said skirt portion, and having a lead frame attachment surface proximate a die-attach surface substantially vertically aligned with the columnar portion, the lead frame attachment surface being attached to the lead frame and extending in close proximity to a substantial part of the enclosed portions of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body, the die-attach surface being attached to the integrated circuit die for reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries". Applicants assert that Marrs or teaches or suggests a one-piece heat sink 110. (FIG. 1). Furthermore, the heat sink in Marrs does not vary in thickness, rather, there is only a slot formed in a portion thereof. (FIGs. 1, 2A, 2B, 4, 8). Additionally, Marrs does not teach or suggest a conductive or ground plane property into the heat sink itself for reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries. Since Marrs fails to teach or suggest all the claim limitations of presently amended independent claim 24, Applicants respectfully submits that Marrs does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of presently amended independent claim 24.

As Marrs fails to teach or suggest all the claim limitations of the claimed invention of presently amended independent claim 24, Applicants assert that presently amended independent claim 24 is allowable.

Independent claim 25 is allowable as Marrs does not identically describe, either expressly or inherently "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink coupled to one of a signal voltage and a reference voltage for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries". Applicants assert that Marrs

describes that the packaged integrated circuit 200 may be placed on a conductive layer 206, which is sandwiched in between dielectric layers 204 and 208, which are formed around the periphery of the die 101 and are external to the heat sink. (Col. 5, lines 34-42). The Applicants' invention incorporates a conductive or ground plane property into the heat sink itself, not the underlying substrate. Marrs fails to identically describe the Applicants presently claimed invention having a conductive or ground plane property into the heat sink itself, not the underlying substrate for reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries. Applicants assert that Marrs fails to identically describe each and every element of claim 25, Applicant respectfully submits that claim 25 is not anticipated by Marrs under 35 U.S.C. § 102.

Applicants assert that claims 26 through 29, 31, 33 through 37, 39 through 45 are each allowable as depending either directly or indirectly from allowable claim 25.

Applicants assert that Marrs does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because Marrs does not teach or suggest the claim limitations of presently amended independent claim 25 calling for "an electrically conductive heat sink positioned having a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of an enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame and with a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink, the heat sink coupled to one of a signal voltage and a reference voltage for the heat sink to operate respectively as a signal plane and a ground plane for the plurality of leads of the lead frame reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries". Applicants assert that Marrs or teaches or suggests a one-piece heat sink 110. (FIG. 1). Furthermore, the heat sink in Marrs does not vary in thickness, rather, there is only a slot formed in a portion thereof. (FIGs. 1, 2A, 2B, 4, 8). Additionally, Marrs does not teach or suggest a conductive or ground plane property into the heat sink itself for reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries. Since Marrs fails to teach or suggest all the claim limitations of presently amended independent claim

25, Applicants respectfully submits that Marrs does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of presently amended independent claim 25.

As Marrs fails to teach or suggest all the claim limitations of the claimed invention of presently amended independent claim 25, Applicants assert that presently amended independent claim 25 is allowable.

Applicants assert that the nonobviousness of independent claim 25 precludes a rejection of claims 26 through 29, 31, 33 through 37, 39 through 45 which depend therefrom because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), *see also* MPEP § 2143.03. Therefore, the Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to presently amended independent claim 25 and claims 26 through 29, 31, 33 through 37, 39 through 45 which depend therefrom.

### **35 U.S.C. § 103(a) Obviousness Rejections**

Obviousness Rejection Based on U.S. Patent 5,701,034 to Marrs as applied to claims 1, 2, 4 through 6, 8 through 20, 24 through 27, 29 through 31 and 33 through 45, and further in combination with U.S. Patent 5,696,031 to Wark

Claims 3, 22 and 28 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Marrs (U.S. Patent 5,701,034) as applied to claims 1, 2, 4 through 6, 8 through 20, 24 through 27, 29 through 31 and 33 through 45, and further in combination with Wark (U.S. Patent 5,696,031). Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on

applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The nonobviousness of independent claims 1 and 25 precludes a rejection of claims 3 and 28 which depends therefrom because a dependent claim is obvious only if the independent claim from which it depends is obvious. *See In re Fine*, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988), *see also* MPEP § 2143.03. Therefore, the Applicants request that the Examiner withdraw the 35 U.S.C. § 103(a) obviousness rejection to independent claims 1 and 25 and claims 3 and 28 which depends therefrom.

Applicants assert that any combination of Marrs and Wark does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 because any such combination fails to teach or suggest all of the claim limitations and that the rejection is based solely upon Applicants' disclosure, not the cited prior art, because the cited prior art contains no suggestion whatsoever for any such claim limitations.

Marrs teaches or suggests a packaged integrated circuit including a heat sink with a locking moat. (Col. 5, lines 1-3). A semiconductor die is attached to a surface of a heat sink using adhesive. (Col. 5, lines 6-8). Package leads are attached to the heat sink also using adhesive. (Col. 5, lines 15-16). Using conventional bond wiring methods the bond wires are extended between the bond pads on the semiconductor die and the heat sink. (Col. 5, lines 18-24). The die, heat sink, bond wires and inner portions of package leads are encapsulated by molding in encapsulant. (Col. 5, lines 24-28). The encapsulant fills in the locking moat formed in the heat sink and becomes interlocked with the heat sink. (Col. 5, lines 29-32). Additionally, Marrs describes or teaches or suggests a packaged semiconductor die or dice including a heat sink with a locking feature that can be used to support one or more generally conductive layers thereon and insulated from the heat sink to provide a ground plane or planes, power plane or planes, or signal routing. (See FIG. 4, COLUMN 4, Lines 10-13.)

Wark teaches or suggests a device and method for stacking wire-bonded integrated circuit dice on flip-chip bonded integrated circuit dice. In addition, Wark teaches or suggests a multi-chip module which is incorporated into a memory device and forms part of an electronic system

that includes an input device, an output device, and a processor. The multi-chip module may be incorporated into any of the devices in the module. (Col. 5, lines 59-65).

Applicants respectfully submit that that any combination of Marrs and Wark fail to teach or suggest the claim limitations of presently amended independent claims 1, 22, and 25 to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claim limitations of the presently claimed invention of presently amended independent claim 22 calling for “a package body”, “an integrated circuit die positioned within the package body”, “a lead frame including a plurality of leads having portions enclosed within the package body that connect to the integrated circuit die, the plurality of leads having portions enclosed within the package body forming an area”, and “an electrically conductive heat sink positioned at least partially within the package body with a surface of a first portion of the heat sink facing the lead frame in close proximity to a substantial part of the enclosed portion of at least eighty percent of the area formed by the plurality of leads of the lead frame having portions enclosed within the package body forming an area and having a die-attach area on the surface of the first portion of the heat sink attached to the integrated circuit die, a second portion of the heat sink under the die-attach area and the integrated circuit die projecting away from the first portion of the heat sink and the integrated circuit die reducing lead inductance of the plurality of leads of the lead frame at least about 0.90 nanoheneries”.

Further, in contrast to the presently claimed invention of presently amended independent claim 22, Applicants assert that Marrs teaches or suggests a one-piece heat sink construction as discussed above which is clearly not the Applicants presently claimed inventions. Wark teaches or suggests stacking the integrated circuit dice to achieve greater component density in the construction of an electronic system.

Applicants submit that the references themselves teach away from any proposed combination thereof and cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the presently claimed invention of presently amended independent claim 22 since Marrs teaches or suggests preventing delamination of the encapsulating material. Wark teaches away from mounting integrated circuit devices on heat sinks, since stacking would prevent the heat sinks from operating effectively and would transfer heat to the lower component in the

stack. Applicants assert that it would not be obvious to combine a method for stacking heat generating integrated circuit devices (Wark) with a method of interlocking encapsulant with a heat sink of Marrs since to do so would destroy the invention of Marrs.

Accordingly, for the reasons herein, Applicants assert that any combination of Marrs and Wark cannot and does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention of presently amended independent claim 22.

#### **ENTRY OF AMENDMENTS**

The amendments to claims 1, 22, 24, and 25 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application to comply with the provisions of 35 U.S.C. § 103.

#### **CONCLUSION**

Claims 1 through 4, 6 through 12, 14 through 29, 31 through 37 and 39 through 45 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully submitted,



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Date: February 17, 2006

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